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UTILIZING NIAGARA FALLS.

The following is an extract from a paper read by Mr. Benj. Rhodes at the recent meeting of the American Association of Civil Engineers, held in this city.

Dynamic electricity is used substantially only for the electric light, but this use has become a great industry. It is the object of this paper to show what has been done and what may be done toward the utilization of Niagara for electrical purposes. The power of Niagara can be estimated very approximately. The average flow of the river according to the many careful measurements is 275,000 cubic feet per second. The fall in the river through the rapids immediately above the falls is sixty-five feet. The height of the falls is 165 feet, making a total of 230 feet; thus we have for the whole power 7,000,000 horse power. To utilize this amount of power by water wheels, generate electrical currents, and transmit to various cities within 500 miles would necessitate a plant representing at least \$5,000,000,000. Such figures as these give some idea of the enormous amount of power here in reserve.

A small proportion of the power of Niagara is already utilized, and a much larger amount can be developed at moderate cost. On the Canada side the entire use is represented by a small overshot wheel under six feet head, which has for many years propelled a solid piston single acting pump, furnishing a meagre supply of water to the adjoining village. On the American side, along the rapids on Goat Island and the mainland, there are five separate raceways using from four to sixteen feet head, and developing in all 800 to 1,000 horse power, most of which is now in actual use. If the project for the appropriation of lands for a State reservation at Niagara is carried out, all these races will come within the fixed bounds of the park, and will of course be odious in the eyes of the commissioners and be swept away.

The greatest power now in use at Niagara, however, lies outside the proposed State Park. It is the Hydraulic Canal and was constructed about 1855. It is cut through solid rock across the peninsula on which the village of Niagara Falls is built, taking the water from the extreme head of the rapids and discharging below the falls, giving opportunity to use the entire head of 230 feet. The canal is nearly one mile long and was planned 100 feet wide and ten feet deep. It has been excavated but seventy feet, and half the distance is but thirty-five feet wide. It is at present partially filled with debris, being at certain points no more than five feet in depth. At the lower end is a basin nearly at right angles with the canal, which may be extended as needed along the river frontage belonging to the Hydraulic Power Company. The canal lay idle for a quarter of a century, and it remained for an enterprising citizen of Buffalo, Mr. J. F. Schoellkopf, possessed of large capital and zeal, to open up this great power. At the time of his purchase—in 1878—there was only one water-wheel on the canal. There is now a large and increasing number of buildings for manufacturing purposes distributed along the high bank of the river, using an aggregate of nearly, or quite, 5,000 horse power. The wheels in these buildings are set under heads of from fifty to 100 feet, and discharge the tail water over the side of the precipice, the various streams falling over 100 feet to the river below. Some of these wheels are of large size when the head is considered, several being capable of giving 1,100 to 1,500 horse power each. The last two years have seen great improvements in the making and setting of wheels, and the working of all the mills is now regular and continuous.

Further developments of power at Niagara may be made at little expense. The Hydraulic Canal can be deepened and widened and wheels may be set under greater heads, the total amount thus made available here being equal to the necessities of many years. Large powers may also be developed at Goat Island and Prospect Park in case the State Park plan is not effected; in either place, 10,000, 25,000 or even 50,000 horse power being easily available. It may safely be said that the use of Niagara has just begun. Low water is unknown; troubles from ice are slight; hours of use are not limited to eight or ten, but twenty-four hours in the day, and 365 days in the year, and unlimited power is ready, making this the most reliable as it is the grandest water power in the world.

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MR. THOMAS McFAUL is the authorized agent and traveling correspondent for this paper.

THE question of utilizing the falls of Niagara is undoubtedly of great interest to engineers as well as to the consumers of power. But the often discussed law of supply and demand cannot be ignored even in such a discussion, and unless there is a demand for such enormous water power in western New York, all figures about its possibilities are of no avail. Such demand can not be created at a moment's notice. It takes years and is of slow growth. The present hydraulic canal, referred to on another page of this issue, is large enough yet for years to come to supply all possible establishments with power; moreover, with our present unrivalled facilities for coal and grain shipments at Buffalo, there is no special inducement for any one to utilize the power of Niagara. The only thing which may tend towards a more complete utilization will be the development of electrical plants, capable of conveying power economically long distances. As soon as electrical science has advanced as far as that, the demand for cheap power at any place will be urgent, and Niagara Falls will prove fully competent to furnish the supply.